REMARKS

Claims 1-6, 16, 17, 21, 22, and 32-39 are pending. Claims 1, 6, and 38 are amended, and claims 21-22 are canceled herein, without prejudice. Favorable reconsideration in light of the amendments and remarks which follow is respectfully requested.

35 U.S.C. §103 Rejections

Claims 1-6, 16, 17, 21, 22, 32-35, 38, and 39 stand rejected under 35 U.S.C. §103(a) over US 3,589,846 (Place), EP 000385910B1 (EP '910), US 5,660,043 (Pfefferle et al), US 5,899,684 (McCoy et al), US 5,206,484 (Issartel), and US 4,106,889 (Katchka). Applicants respectfully traverse.

Without agreeing with or acquiescing to the rejections, Applicants have further amended the claims so as to set out that the control device is configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is maintained at a temperature less than the gas ignition temperature but above room temperature, and so that upon detection of a loss of flame the electric resistance ceramic igniter is re-heated so as to re-ignite the gas within about 4 second or less. It is submitted that none of the references when taken alone or in combination teach or suggest such a control system.

The Office acknowledges that Place does not disclose a control device: (a) configured and arranged so that following successful ignition of the gas, operation of the electric resistance igniter is controlled so the electric resistance ceramic igniter can be re-heated so as to re-ignite the gas within a re-ignition time period of about 4 second or less, as provided in all independent claims (claims 1, 6 and 38), and (b) including the micro-controller and applications program as outlined in dependent claim 4.

Applicants further submit that not only does Place not disclose a control device that is configured and arranged so that upon detection of a loss of flame following successful ignition, the electric resistance ceramic igniter is re-heated to re-ignite the gas within about 4 second or less, but Place explicitly describes a system that requires

60 seconds for re-ignition (15 times that provided in Applicants' claims). In particular, Place describes a system wherein for "normal ignition" (i.e. initial ignition started from a cool condition), ignition occurs within about 30 seconds after line-voltage is supplied to the igniter (see col. 6, lines 18-20). As set out by Place, if premature termination of the combustion (i.e. loss of a flame) occurs for any reason, an automatic recycling is provided (see col. 5, lines 54-55). According to Place, this process of re-igniting the burner after it is detected that combustion has terminated for any reason takes about 60 seconds because Place specifically provides a system wherein cooling must occur, followed by re-heating of the igniter to the necessary temperature (col. 6, lines 18-46). Thus, not only does Place not teach or suggest Applicants' claimed control device configuration which provides for re-ignition within 4 seconds or less after detection of a loss of flame, but Place actually teaches a control system that requires a re-ignition process that takes about 60 seconds after termination of combustion has been detected.

The Office points to EP '910 as allegedly describing the micro-controller and applications program. Without agreeing with or acquiescing to this assertion, Applicants submit that EP '910 does not remedy the deficiencies in Place with respect to a control device configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is re-heated to re-ignite the gas within about 4 second or less.

The Office points to Pfefferle at column 4, lines 15-30 as allegedly describing a control system that:

> wherein following successful ignition of the gas, operation of the electric resistance igniter is controlled so the electric resistance igniter is at a temperature less than the gas ignition temperature so the electric resistance igniter can be re-heated so as to re-ignite the gas within a desired re-ignition time period.

and asserts that it would be obvious to modify the controller of Place in light of Pfefferle such that "continuous controlled heating may be utilized to provide near instantaneous relight". Applicants respectfully disagree.

As set out above, Place is specifically designed such that following termination of combustion for any reason, re-ignition automatically and necessarily follows through a cooling/reheating process that takes about 60 seconds. Thus, there is absolutely no teaching or suggestion to modify Place as proposed by the Office so as to eliminate this cooling/reheating process that is specifically required by the teaching of Place.

Applicants further note that Pfefferle describes heating elements/igniters that are metal catalysts or are coated with ignition catalysts (see, e.g. col. 2, lines 46-63). By using catalyzed igniters, combustion can occur at lower temperatures than those required for non-catalyzed igniters. Further, Pfefferle's systems requires the use of a liquid fuel atomizer to provide atomized liquid fuels for ignition. Thus, Pfefferle is directed towards a system and method wherein liquid fuels are used for combustion in contrast to Applicants' (and Place's) systems and methods wherein a gas (as set out in the claims) used for combustion. Thus, it is respectfully submitted that there is further no teaching or suggestion to modify Place in view of Pfefferle, nor would there be any reasonable expectation of success in doing this in attempts to provide Place with Pfefferle's re-ignition properties because Pfefferle describes the ignition of catalyzed igniters using liquid atomized fuels in contrast to ignition of non-catalyzed igniters using gaseous fuels.

With respect to McCoy, the Office asserts that McCoy teaches "to provide fast re-ignition period of less than 6 seconds" (June 23, 2009 Final Office Action at page 9), by citing col. 1, lines 24-26, which states: "if a flame is not detected in less than one second". However, this is merely a time period following an attempt to ignite to determine whether ignition has occurred – this is not a time period for re-ignition following detection of a loss of flame. Specifically, McCoy sets out, at col. 1, lines 21-26, that the device:

> further includes a trial ignition period during which time a blower motor of the split-phase type, and having a main winding and an auxiliary start winding, provides both air and fuel to the combustion chamber. If a flame is not detected in less than one second, the device is de-energized and

starting must be retried.

Thus, all this passage deals with is a period of one second following an attempt to start (ignite) to determine whether the attempt was successful. It has nothing to do with a re-ignition time period upon detection of a loss of flame after successful ignition.

The next passages cited by the Office - col. 1, lines 34-45 and col. 5, lines 59-64 read:

> In the third embodiment of the present invention, a first circuit is provided that applies full-wave voltage to the ignitor only during the preheat and ignition trial periods for ignition purposes. A second circuit is provided that applies half-wave voltage to the ignitor continuously, beginning with the RUN period, for fast re-ignition and to burn any fuel coming in contact with the ignitor during the RUN period and thus prevents carbon buildup on the ignitor, especially if heavy fuels, such as diesel, are used. A third circuit is provided which automatically adjusts the preheat time and the ignition on-time, depending on the applied line voltage and the current draw of the ignitor.
>
> Thus the third embodiment of the present invention provides numerous advantages over the prior art. First, it has a very simple electronic circuit that has a self-adjusting ignitor preheat time period, a self-adjusting ignition trial period, and a subsequent flame test in which, if no flame is apparent, the system shuts down by removing not only the voltage to the ignitor assembly but also to the fan blower assembly that stops the air and fuel from being provided to the combustion chamber.

However, nowhere in these passages or elsewhere in the McCoy reference is a control device taught or suggested to be configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is re-heated to re-ignite the gas within about 4 second or less.

Issartel is cited as allegedly describing that parameters can be varied so as to provide certain times for *preheating* glow plugs. However, this has nothing to do with

Applicants claimed subject matter which is a control device configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so as to maintain the igniter at the specified temperature so the electric resistance ceramic igniter is re-heated to re-ignite the gas within about 4 second or less. Thus, while Issartel may relate to selection of parameters to allow a glow plug to be preheated in a certain time, it has nothing to do with detection of a loos of flame and controlling an igniter in a state such that the igniter is re-ignited within 4 seconds of detection of a loss of flame.

Katchka is cited for allegedly describing use of various combustible fuels and, as such, to support the assertion that the use of a given ignition system with any given appliance would have been obvious. Without agreeing with or acquiescing to this rejection, Applicants respectfully submit that even if Katchka was combined with Place, EP '910, Pfefferle, McCoy, and Issartel, Applicants claimed control systems still would not be taught or suggested. In particular, there is no teaching or suggestion of Applicants' control device which is configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is maintained at a temperature less than the gas ignition temperature but above room temperature, and so that upon detection of a loss of flame the electric resistance ceramic igniter is re-heated so as to re-ignite the gas within about 4 second or less.

In view thereof, it is respectfully submitted that claims 1, 6 and 38 are patentable over Place, EP '910, Pfefferle, McCoy, Issartel, and Katchka. Claims 2-5, 16, 17, 32-35, and 39 depend from claims 1, 6 and 38, and thus also are patentable over Place, EP '910, Pfefferle, McCoy, Issartel, and Katchka. Reconsideration and withdrawal of the rejections is respectfully requested in view thereof.

Claims 36 and 37 are rejected under 35 U.S.C. §103(a) over Place, EP'910, Pfefferle, McCoy, US 4,418,661 (Esper), US 5,233,166 (Maeda et al), and US 4,762,982 (Ohno et al). Applicants respectfully traverse.

As set out above, no combination of Place, EP '910, Pfefferle, and McCoy teach or suggest Applicants' control device which is configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is maintained at a temperature less than the gas ignition temperature but above room temperature, and so that upon detection of a loss of flame the electric resistance ceramic igniter is re-heated so as to re-ignite the gas within about 4 second or less.

Esper, Maeda, and Ohno are cited as allegedly teaching that sintered ceramic electric resistance ignition elements are known to be used widely as an ignition source for various combustion and heating apparatuses, can quickly raise temperature (citing Maeda), can quickly achieve preheat temperature necessary to ignite fuel vapor-air mixture "in less than 1 second" (citing Esper), and "for example to about 900°C in about three seconds" (citing Ohno).

Applicants respectfully submit that Maeda does not remedy the above-noted deficiencies in Place, EP '910, Pfefferle, and McCoy. Applicants do not claim a control system that can quickly raise temperature. Applicants claim a control system configured and arranged so that following successful ignition of the gas, voltage and current applied to the igniter are controlled so the electric resistance ceramic igniter is maintained at a temperature less than the gas ignition temperature but above room temperature, and so that upon detection of a loss of flame the electric resistance ceramic igniter is re-heated so as to re-ignite the gas within about 4 second or less. Maeda is silent with respect to this claim limitation.

Esper also does not remedy the above-noted deficiencies in Place, EP '910, Pfefferle, and McCoy. Applicants do not claim a control system that preheats an igniter so as to achieve ignition in less than one second. Applicants' claims are directed to control devices that provide re-ignition upon detection of a loss of flame within 4 seconds. Esper is silent with respect to this claim limitation.

Ohno also does not remedy the above-noted deficiencies in Place, EP '910,

Pfefferle, and McCoy. Applicants do not claim a control system that provides an initial current to heat a glow plug to 900°C within three seconds. Applicants' claims are directed to control devices that provide re-ignition upon detection of a loss of flame within 4 seconds. Ohno is silent with respect to this claim limitation.

In view thereof, it is respectfully submitted that claim 1 (and, thus also dependent claims 36 and 37) are patentable over Place, EP '910, Pfefferle, McCoy, Esper, Maeda, and Ohno. Reconsideration and withdrawal of the rejections is respectfully requested in view thereof.

CONCLUSION

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested. If for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. 04-1105.

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Respectfully submitted,

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